IN THE DRAWINGS

The attached sheets of drawings includes changes to Figs. 1 and 2. These sheets, which include Figs. 1 and 2, replace the original sheets filed December 31, 2001.

Attachment: Replacement Sheets

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-9 are currently pending. Claims 1-9 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Figures 1-3 were objected to as not containing a legend such as "prior art"; the Abstract was objected to as not being a single paragraph; the specification was objected to as not containing appropriate section headings and for various informalities; Claim 1 was objected to regarding the use of the symbol K; Claims 6-9 were objected to under 37 C.F.R. § 1.75(c) as being improper multiple dependent claims; Claims 1-9 were rejected under 35 U.S.C. § 112, first paragraph, as being non-enabled regarding the affine subspace limitation; Claims 1-5 and 7-9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brunel et al. ("Euclidian Space Lattice Decoding for Joint Detection in CDMA systems") in view of Umeda et al. ("An Adaptive Filtering Algorithm using an Orthogonal Projection to an Affine Subspace and its Properties"); and Claim 6 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Brunel et al. and Umeda et al. references, further in view of PCT application No. WO 00/41374 to Tanrikulu (hereinafter "the '374 publication").

Applicant wishes to thank the Examiner for the interview granted Applicant's representative on April 25, 2005, at which time a proposed amendment to Claim 1 was discussed. In particular, an affine subspace delimiting a constellation was discussed. However, no agreement was reached pending the Examiner's further consideration of the claims upon formal submission of a response to the outstanding Office Action.

In response to the objection to the Drawings, Figures 1 and 2 have been amended to include the designation "Background Art." However, Applicant respectfully submits that Figure 3 is not discussed in the Background section of the present application, and is not directed to Background Art. Accordingly, the objection to the Drawings is believed to have been overcome.

In response to the objection to the Abstract, the Abstract has been amended to be a single paragraph. Accordingly, the objection to the Abstract is believed to have been overcome.

In response to the objection to the specification, the specification has been amended to include appropriate section headings and to address the informalities noted in the Office Action. Accordingly, the objection to the specification is believed to have been overcome.

In response to the objection to the claims, the claims have been amended to address the objections noted in the Office Action. In particular, Claims 6-9 have been omitted to no longer be multiple dependent claims. Further, Claim 1 has been amended to no longer recite a plurality K of symbols. Accordingly, the objections to the claims are believed to have been overcome.

Applicant respectfully traverses the rejection of the claims under 35 U.S.C. § 112, first paragraph. Initially, Applicant respectfully submits that an affine transformation is well-known in the engineering and mathematical arts, being defined, e.g., as a transformation that transforms parallel lines into parallel lines but may change the distances between points. Similarly, Applicant respectfully submits that an affine subspace is correspondingly well-known in this art. Moreover, Applicant notes that affine transformations and subspaces are discussed in the specification in several locations. See, e.g., page 5 and pages 15-18. See in particular page 17, lines 14-23. Further, Applicant submits that Claim 1 refers to two different affine subspaces, one of which delimits (or borders) the constellation. Accordingly,

for the reasons stated above, Applicant respectfully traverses the rejection of theclaims under 35 U.S.C. § 112.

Amended Claim 1 is directed to a method of detecting, from a received signal, a plurality of symbols transmitted by or to a plurality of users, each symbol of a user belonging to a modulation constellation, the detection method using a lattice of points generated by a constellation including the modulation constellations, the plurality of symbols of the users being represented by a point among a subset of points in the lattice, the constellation and the receive signal being represented by a point characteristic of the signal, referred to as the received point, translated from a point in the constellation by a noise vector, the method comprising: (1) orthogonally projecting the received point onto a first affine projection subspace that is parallel to or merged with a second affine subspace delimiting the constellation; and (2) determining a closest neighbor to the projected point among the points in the constellation. Claim 1 has been amended for the purpose of clarification only and no new matter has been added.

Regarding the rejection of Claim 1 under 35 U.S.C. § 103, the Office Action asserts that the Brunel et al. reference discloses everything in Claim 1 with the exception of the projecting and determining steps, and relies on the Umeda et al. reference to remedy those deficiencies.

The Brunel et al. reference is directed to a joint detection method based on sphere packing lattice decoding suitable for both synchronous and asynchronous CDMA systems. Initially, Applicant notes that the present inventor the principal author of the Brunel et al. reference and that the Brunel et al. reference is specifically discussed on page 2 of the specification. Thus, as admitted in the Office Action, the Brunel et al. reference fails to disclose orthogonally projecting a received point onto a first affine subspace and determining

a closest neighbor to the projected point among the points in the constellation, as recited in amended Claim 1.

The Umeda et al. reference is directed to an adaptive filtering algorithm that involves orthogonal projection to an affine subspace. As shown in Figure 1, the Umeda et al. reference is directed to a learning system for identifying the coefficients of a linear system using the known outputs of the system to be identified. In particular, the Umeda et al. reference discloses a system in which the coefficients v_k are identified using a modification of the well-known LMS algorithm developed by Widrow et al. The algorithm involves the computation of the generalized inverse of a matrix consisting of input vectors X, as shown on page 22 of the Umeda et al. reference. As such, the algorithm inherently involves a projection of the real space onto an affine subspace. However, Applicant notes that the learning algorithm is designed to iteratively update the coefficients v_K, which are the coefficients in a linear discrete-time system.

Accordingly, Applicant respectfully submits that the Umeda et al. reference is non-analogous art. The Office Action has not indicated that learning system identification method could be considered within the field of Applicant's invention. CDMA decoders and learning systems are completely different fields. Moreover, the Office Action has not identified why one of ordinary skill in the art would have thought that a learning system was pertinent to problem solved by the invention. Without recognizing the pertinence of the field to the problem, one of ordinary skill would not have been motivated to make the asserted combination.

Further, Applicant respectfully submits that the Umeda et al. reference fails to disclose orthogonally projecting a received point (wherein the received point represents a received communications signal) onto a first affine projection subspace, parallel to or merged with a second affine subspace delimiting a constellation, as recited in amended Claim 1. The

Umeda et al. reference fails to disclose modulation constellations, and the affine transformation noted in the Umeda et al. reference is simply used to explain why the proposed algorithm might be an improvement over the LMS algorithm, but is concerned with a projection of linear coefficients, not received signals. Further, the Umeda et al. reference fails to disclose determining the closest neighbor to a projected point among points in a constellation, as recited in amended Claim 1. In this regard, Applicant notes that the Office Action fails to specifically identify how the Umeda et al. reference discloses the determining step recited in Claim 1.

Thus, no matter how the teachings of the Brunel et al. and Umeda et al. references are combined, the combination does not teach of suggest the determining and projecting steps recited in amended Claim 1. Accordingly, Applicant respectfully submit that a *prima facie* case of obviousness has now been established and the rejection of Claim 1 (and dependent Claims 2-5) should be withdrawn.

Regarding the rejection of Claim 6 under 35 U.S.C. § 103(a), Applicant respectfully submits that the '374 publication fails to remedy the deficiencies of the Umeda et al. and Brunel et al. references. Accordingly, Applicant respectfully submits that a *prima facie* case of obviousness has now been established and that the rejection of Claim 6 should be withdrawn.

Claims 8 and 9 have been amended to be independent claims reciting limitations analogous to limitations recited in Claim 1. Accordingly, for the reasons stated above for the patentability of Claim 1, Applicant respectfully submits that Claims 8 and 9 patentably define over any proper combination of the cited references.

Thus, it is respectfully submitted that independent Claims 1, 8, and 9 (and all associated dependent claims) patentably define over any proper combination of the Brunel et al. reference, the Umeda et al. reference, and the '374 publication.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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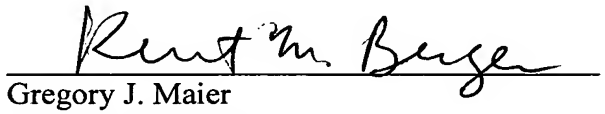

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